Quantum For Environment - Ideation Forum

Brainstorm session

September 18, 2023

TQT Transformative Quantum Technologies

Climate Change

- Using quantum computers for climate change modeling

Earth Imaging/Explorations

- Photon detectors or trace gas measurements from Low Earth Orbit

Water

- Single - photon detector for water level and water quality control

Human Health Impacted by Changing Environment

- Using SQUID for detecting microplastics type and amount

Energy

- Storing energy in superconducting magnets
- Large DFT-Daset enabled
- Inverse design of green materials

Agriculture

- Precise temperature gradient measurement across area of soil can measure H2O content (cheap methods exist for mass production).
  - Many units over large area can provide measures desertification!
- Neutron/x-ray diffraction can very precisely measure ‘leaking’ (monitoring spoilage, rot, blight) gases in soil near farming sites
- Measuring optical characteristics of plants/crops (seeds?) using polarized light e.g. water content, gas absorption
- Measuring water salinity on-site/without necessary training /lab setup -- fish farms measurement requirements
- Gene identification for crops using a hybrid QC to optimize parameterization instead of relying on cross-breeding
- Spectral analysis of soil to determine nutrient content for crop-rotation
- Water-retaining materials in soil
- Quick test of water pollutants on site

Pollutants

- Detection of free radicals and heavy metals, CO2 (detection air) NV Centers, pathogens
- Design materials/compounds to capture carbon/methane from air
- Lattice mod of NV for increased capture

Data security

- Quantum key distribution
- Store information with quantum device

Other

- Quantum algorithms
  - Explorations of novel green solvents;
  - agriculture practices optimization;
  - weather prediction especially related to extreme events such as droughts
- Quantum simulation
  - Chemical processes in pollution
  - Catalysts;
  - Photovoltaics: to detect fire and smoke through image.